

Europäisches Patentamt
European Patent Office
Office européen des brevets



(11) EP 1 471 691 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
27.10.2004 Bulletin 2004/44

(51) Int Cl.7: H04L 12/28, H04L 12/56

(21) Application number: 04101666.8

(22) Date of filing: 21.04.2004

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IT LI LU MC NL PL PT RO SE SI SK TR
Designated Extension States:
AL HR LT LV MK

(30) Priority: 22.04.2003 KR 2003025527
12.11.2003 KR 2003079912
11.12.2003 KR 2003090039

(71) Applicant: Samsung Electronics Co., Ltd.
Suwon-si Gyeonggi-do 442-742 (KR)

(72) Inventors:
• Kim, Jin-hyung
Suwon-si, Gyeonggi-do (KR)
• Oak, Seung-soo
Bundang-gu, Gyeonggi-do (KR)
• Lee, Jin-tack
Seoul (KR)
• Bae, Sung-hoon
Suwon-si, Gyeonggi-do (KR)

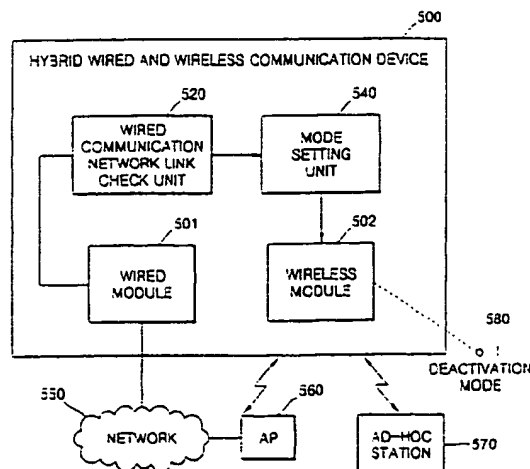
(74) Representative: Read, Matthew Charles et al
Venner Shipley LLP
20 Little Britain
London EC1A 7DH (GB)

(54) Device and method for hybrid wired and wireless communication

(57) A hybrid wired and wireless communication device and a wired and wireless communication method thereof. The wired and wireless communication method includes determining whether a wired communication module has been linked to a wired communication network (72), setting a wireless communication operating mode of a wireless communication module to an infrastructure mode when it is determined that the wired communication module has not been linked to the wired

communication network (74), and setting the wireless communication operating mode to an ad-hoc mode when it is determined that the wired communication module has been linked to the wired communication network (76). Therefore, the wireless communication operating mode is automatically set according to whether the wired communication network has been linked to the wired communication module, thereby increasing a user's convenience.

FIG. 9



EP 1 471 691 A2

Description

[0001] The present invention relates to an electronic apparatus comprising wired communication means, wireless communication means operable in an infrastructure mode and control means.

[0002] A hybrid wired and wireless communication device includes both a wired communication module and a wireless communication module in order to communicate by wire and wirelessly with other communication devices. Here, the wireless communication operating modes of the wireless communication module are largely divided into an infrastructure mode and an ad-hoc mode. The ad-hoc mode is also referred to as a peer-to-peer mode.

[0003] Figure 1 illustrates a network in the infrastructure mode. The network includes wired communication devices 30, 32, 34, wireless communication devices 38, 40 and an access point (AP) 36.

[0004] In Figure 1, for wireless communication, the wireless communication devices 38, 40 are wirelessly linked to the AP 36 and communicate with the wired communication devices 30, 32, 34 via the AP 36. Meanwhile, the wired communication devices 30, 32, 34 communicate with one another by wire. As described above, a mode in which a communication device does not directly communicate with another wired or wireless communication device, but instead communicates with another wired or wireless communication device via the AP 36 constructed on a wired local area network (LAN) 39 is referred to as the infrastructure mode.

[0005] Figure 2 illustrates a network in the ad-hoc mode. The network includes wireless communication devices 50, 52, 54. In Figure 2, for wireless communication, the wireless communication devices 50, 52, 54 directly and wirelessly communicate with one another without using a wireless relay device such as the AP 36 shown in Figure 1. As described above, a mode in which a communication device directly and wirelessly communicates with another communication device without requiring a relay, such as the AP 36, is referred to as the ad-hoc mode.

[0006] A communication device shown in Figure 1 or Figure 2 may be a personal computer (PC), a notebook computer, a personal digital assistant (PDA), a server or a peripheral device such as a printer, a scanner or a video camera.

[0007] Wireless communication operating modes, the infrastructure mode and the ad-hoc mode, are set and operated in accordance with a user's choice. Conventionally, it is very inconvenient for a user to manually change the wireless communication operating mode of a hybrid wired and wireless communication device. In addition, a user who is not familiar with a computer may feel uncomfortable in changing the wireless communication operating mode.

[0008] Furthermore, when hybrid wired and wireless communication devices are connected to a wired com-

munication network and are in the ad-hoc mode, wired communication can be performed by wired communication modules and wireless communication can also be performed by wireless communication modules. However, when the hybrid wired and wireless communication devices connected to the wired communication network are in the infrastructure mode, data received and transmitted by an AP is transmitted to the wired communication devices 30, 32, 34 and the wireless communication devices 38, 40 through the wired LAN 39 and is also transmitted to the wired communication devices 30, 32, 34 and the wireless communication devices 38, 40 wirelessly. In other words, the hybrid wired and wireless communication devices redundantly transmit or receive the same data by wire and wirelessly in the infrastructure mode. Accordingly, a hybrid wired and wireless communication device only uses the data transmitted and received by wire, which has less transmission errors than the wirelessly received data, and deletes the wirelessly transmitted and received data. Consequently, redundant data transmission and reception wastes the resources of a network environment. Moreover, since the same data is received redundantly, deletion of duplicate data is required, which results in a waste of power. The waste of the resources of the network environment and the waste of power cause the performance of a hybrid wired and wireless communication device to deteriorate.

[0009] An electronic apparatus, according to the present invention, is characterised in that the control means is operable to switch the wireless communication means out of said infrastructure mode in response to a signal indicating that the wired communication means is connected to a wired network.

[0010] Preferably, the control means is configured to switch the wireless communication means out of said infrastructure mode and into an ad-hoc mode in response to said signal.

[0011] Preferably, the control means is configured to switch the wireless communication means out of said infrastructure mode and into a dormant mode in response to said signal.

[0012] Embodiments of the present invention will now be described, by way of example, with reference to Figures 3 to 9 of the accompanying drawings, in which:

Figure 1 illustrates a network in an infrastructure mode;

Figure 2 illustrates a network in an ad-hoc mode;

Figure 3 is a flowchart illustrating an embodiment of a wired and wireless communication method used with a hybrid wired and wireless communication device (see Figure 9) according to the present invention;

Figure 4 is a diagram showing an example of a user interface screen provided to a user so that the user can set a wireless communication operating mode; Figure 5 is a flowchart illustrating another embodi-

ment of a wired and wireless communication method used with a hybrid wired and wireless communication device according to the present invention; Figure 6 is a flowchart illustrating yet another embodiment of a wired and wireless communication method used with a hybrid wired and wireless communication device according to the present invention;

Figure 7 is a block diagram of an embodiment of a hybrid wired and wireless communication device according to the present invention;

Figure 8 is a block diagram of another embodiment of a hybrid wired and wireless communication device according to the present invention; and

Figure 9 illustrates yet another embodiment of a hybrid wired and wireless communication device according to the present invention.

[0013] Referring to Figure 3, the wired and wireless communication method includes setting a wireless communication operating mode of a wireless communication module according to whether a wired communication module is linked to a wired communication network in operations 70 to 76.

[0014] The hybrid wired and wireless communication device performing the wired and wireless communication method of the present invention wirelessly communicates with at least one other communication device through a wireless communication module or communicates by wire with at least one other communication device through a wired communication module linked to a wired communication network, e.g. a local area network (LAN).

[0015] In operation 70, the setting of the wireless communication module is checked to determine whether the wireless communication operating mode has been set to an automatic selection mode. The wireless communication operating mode can be set to an infrastructure mode, an ad-hoc mode or an automatic selection mode. The automatic selection mode allows the wireless communication module to be automatically set to one of the infrastructure mode and the ad-hoc mode according to whether the wired communication module is linked to a wired communication network.

[0016] Referring to Figure 4, when the user interface screen is displayed to a user, the user can set the wireless communication operating mode, in which the wireless communication module will operate, to an ad-hoc mode 90, an infrastructure mode 92 or an automatic selection mode 94.

[0017] When it is determined that the wireless communication operating mode has not been set to the automatic selection mode, the wired and wireless communication method ends. However, when it is determined that the wireless communication operating mode has been set to the automatic selection mode, it is determined whether the wired communication module has been linked to a wired communication network in oper-

ation 72. To determine whether the wired communication module has been linked to the wired communication network, a physical-layer device chip managing communication of the wired communication network is used.

5 The physical-layer device chip determines whether communication can be performed in a hub, a switch or a physical layer connected to the wired communication network. When the wired communication module is linked to the wired communication network, the physical-layer device chip recognizes the wired communication network as being in a link-on state. When the wired communication module is not linked to the wired communication network, the physical-layer device chip recognizes the wired communication network as being in a link-off state.

10 [0018] When it is determined that the wired communication module has not been linked to the wired communication network, the wireless communication operating mode of the wireless communication module is set to the infrastructure mode in operation 74. However, when it is determined that the wired communication module has been linked to the wired communication network, the wireless communication operating mode of the wireless communication module is set to the ad-hoc mode in operation 76. In this situation, the hybrid wired and wireless communication device communicates by wire with other communication devices through the wired communication module linked to the wired communication network and wirelessly communicates with other communication devices through the wireless communication module. An illustration of this is provided in Figure 9, to be discussed in more detail below.

15 [0019] In another embodiment of the present invention, operation 70 shown in Figure 3 may be omitted. In this situation, the wireless communication operating mode is automatically set to the infrastructure mode or the ad-hoc mode in the automatic selection mode.

[0020] In yet another embodiment of the present invention, operation 72 may be performed in the initial state of the hybrid wired and wireless communication device or may be periodically performed during run-time of the hybrid wired and wireless communication device.

20 [0021] As described above, while the hybrid wired and wireless communication device is linked to a wired communication network, when the wireless communication module is automatically set to the ad-hoc mode allowing peer-to-peer communication, the hybrid wired and wireless communication device can perform wired communication with other communication devices through the wired communication network and also perform direct wireless communication with other communication devices through the wireless communication module. When the wireless communication module is set to the infrastructure mode while the hybrid wired and wireless communication device is linked to the wired communication network, communication resources are unnecessarily wasted. In other words, once the wired communication module is linked to the wired communication net-

work, the infrastructure mode is not actually required to provide network connectivity. To prevent this unnecessary waste of resources, in the present invention, the wireless communication module is automatically set to the ad-hoc mode when the wired communication module is linked to a wired communication network.

[0022] Referring to Figure 5, the wired and wireless communication method includes deactivating a wireless communication module when it is determined that a wired communication module has been linked to a wired communication network in a state where a wireless communication operating mode has been set to an infrastructure mode in operations 100 to 106.

[0023] In operation 100, it is determined whether the wireless communication operating mode has been set to the infrastructure mode. A user can set the wireless communication operating mode, in which the wireless communication module will operate, to an ad-hoc mode or an infrastructure mode on the user interface screen shown in Figure 4. Accordingly, in operation 100, it is determined whether the wireless communication operating mode set by the user is the ad-hoc mode or the infrastructure mode.

[0024] When it is determined that the wireless communication operating mode has not been set to the infrastructure mode, the wired and wireless communication method ends. However, when it is determined that the wireless communication operating mode has been set to the infrastructure mode, it is determined whether the wired communication module has been linked to the wired communication network in operation 102. To determine whether the wired communication module has been linked to the wired communication network, a physical-layer device chip managing communication of the wired communication network is used, as described above.

[0025] When it is determined that the wired communication module has been linked to the wired communication network, the wireless communication module is deactivated in operation 104. The wireless communication module can be deactivated in various ways. Firstly, the wireless communication module can be deactivated by blocking a medium access control (MAC) port of the wireless communication module. For example, if a hybrid wired and wireless communication device using a universal serial bus (USB) wireless communication module commands the USB wireless communication module to deactivate a MAC port through a USB, the USB wireless communication module deactivates the MAC port in response to the command. Secondly, the wireless communication module can be deactivated by interrupting power supplied to the wireless communication module. For example, if the hybrid wired and wireless communication device interrupts power supplied to the wireless communication module, the wireless communication module cannot operate.

[0026] When the wired communication module is linked to the wired communication network in a state

where the wireless communication operating mode has been set to the infrastructure mode, data can be received through the wired communication network. Accordingly, receiving the data through the wireless communication module is not necessary. In this situation, if the wireless communication module is deactivated, the wireless communication module cannot receive data. As a result, deletion of redundant data is not required, thereby preventing waste of power and resources of the wireless communication module.

[0027] However, when it is determined that the wired communication module has not been linked to the wired communication network, the wireless communication module is activated in operation 106.

[0028] When the wired communication module is not linked to the wired communication network in a state where the wireless communication operating mode has been set to the infrastructure mode, the hybrid wired and wireless communication device cannot receive data through the wired communication network but receives data wirelessly only through an access point (AP) connected to the wired communication network. Accordingly, data is not redundantly received even though the wireless communication operating mode is set to the infrastructure mode. Therefore, the wireless communication module is activated to construct a network environment in which data can be received through the wireless communication module.

[0029] When it is determined that the wired communication module has not been linked to the wired communication network in a state where the wireless communication module has been activated, the wireless communication module remains activated.

[0030] Referring to Figure 6, the wired and wireless communication method includes deactivating or activating a wireless communication module according to a result of determining whether a wired communication module has been linked to a wired communication network in operations 200 to 204.

[0031] In operation 200, it is determined whether the wired communication module has been linked to the wired communication network. To determine whether the wired communication module has been linked to the wired communication network, a physical-layer device chip managing communication of the wired communication network is used, as described above.

[0032] When it is determined that the wired communication module has been linked to the wired communication network, the wireless communication module is deactivated in operation 202. The wireless communication module can be deactivated in various ways, as described above. When the wired communication module is linked to the wired communication network, data can be transmitted and received only by wire. In other words, since the wireless communication module is deactivated, data cannot be received through wireless communication.

[0033] However, when it is determined that the wired

communication module has not been linked to the wired communication network, the wireless communication module is activated in operation 204. When the wired communication module is not linked to the wired communication network, the hybrid wired and wireless communication device cannot receive data through the wired communication network. In this situation, the hybrid wired and wireless communication device can wirelessly receive data through an AP connected to the wired communication network in the infrastructure mode or can receive data through a wireless LAN in an ad-hoc mode.

[0034] The structure and operations of a hybrid wired and wireless communication device according to the present invention will now be described.

[0035] Referring to Figure 7, the hybrid wired and wireless communication device includes a setting check unit 300, a wired communication network link check unit 320 and a mode setting unit 340.

[0036] For clarity of the description, the hybrid wired and wireless communication device shown in Figure 7 will be described with reference to Figure 3 showing a wired and wireless communication method. When the wired and wireless communication method shown in Figure 3 does not include operation 70, the hybrid wired and wireless communication device may not include the setting check unit 300.

[0037] To perform operation 70, the setting check unit 300 checks the setting of a wireless communication operating mode to determine whether the wireless communication operating mode has been set to an automatic selection mode and outputs a check result as a setting check signal to the wired communication network link check unit 320.

[0038] To perform operation 72, in response to the setting check signal received from the setting check unit 300, the wired communication network link check unit 320 checks whether the wired communication module has been linked to the wired communication network and outputs a check result as a link check signal to the mode setting unit 340.

[0039] To perform operations 74 and 76, the mode setting unit 340 sets the wireless communication operating mode to an infrastructure mode or an ad-hoc mode in response to the link check signal received from the wired communication network link check unit 320. Consequently, the wireless communication module of the hybrid wired and wireless communication device performs wireless communication in a mode set by the mode setting unit 340. For example, when it is determined that the wired communication module has been linked to the wired communication network based on the link check signal received from the wired communication network link check unit 320, the mode setting unit 340 sets the wireless communication operating mode to the ad-hoc mode. However, when it is determined that the wired communication module has not been linked to the wired communication network based on the link

check signal received from the wired communication network link check unit 320, the mode setting unit 340 sets the wireless communication operating mode to the infrastructure mode.

5 [0040] Referring to Figure 8, the hybrid wired and wireless communication device includes an operating mode check unit 400, a wired communication network link check unit 420 and a wireless communication module activating unit 440.

10 [0041] For clarity of the description, the hybrid wired and wireless communication device shown in Figure 8 will be described with reference to Figure 5 showing the wired and wireless communication method thereof. In performing the wired and wireless communication method shown in Figure 6, the hybrid wired and wireless communication device shown in Figure 8 may not include the operating mode check unit 400.

15 [0042] To perform operation 100, the operating mode check unit 400 checks whether a wireless communication operating mode has been set to an infrastructure mode or an ad-hoc mode and outputs a check result as an operating mode check signal to the wired communication network link check unit 420.

20 [0043] To perform operation 102, the wired communication network link check unit 420 checks whether a wired communication module has been linked to a wired communication network in response to the operating mode check signal received from the operating mode check unit 400, and outputs a check result as a link check signal to the wireless communication module activating unit 440. The wired communication network link check unit 420 is implemented in a physical chip (not shown) managing communication of the wired communication network. The wired communication network link check unit 420 in the physical chip verifies whether communication can be performed in a hub, a switch, or a physical layer, which is connected to the wired communication network. When the wired communication module has been linked to the wired communication network, the wired communication network link check unit 420 recognizes the wired communication network as being in a link-on state and outputs a link check signal indicating the link-on state to the wireless communication module activating unit 440. However, when the wired communication module has not been linked to the wired communication network, the wired communication network link check unit 420 recognizes the wired communication network as being in a link-off state and outputs a link check signal indicating the link-off state to the wireless communication module activating unit 440.

25 [0044] To perform operations 104 and 106, the wireless communication module activating unit 440 activates or deactivates the wireless communication module in response to the link check signal received from the wired communication network link check unit 420. The wireless communication module activating unit 440 deactivates the wireless communication module by blocking a MAC port of the wireless communication

module or by interrupting power supplied to the wireless communication module.

[0045] Referring to Figure 9, the hybrid wired and wireless communication device 500 includes a wired communication network link checking unit 520, a mode setting unit 540, a wired communication module 501 and a wireless communication module 502. The wired communication network link checking unit 520 checks whether the wired communication module 501 has been linked to a wired communication network 550. When the wired communication module 501 has been linked to the wired communication network 550, the wired communication network link check unit 520 recognizes the wired communication network as being in a link-on state and outputs a link check signal indicating the link-on state to a wireless mode setting unit 540. Here, the wireless communication module 502 is switched to the ad-hoc mode and communicates directly to an ad-hoc station 570.

[0046] Alternatively, when the wired communication module 501 has not been linked to the wired communication network 550, the wired communication network link check unit 520 recognizes the wired communication network 550 as being in a link-off state and outputs a link check signal indicating the link-off state to the wireless mode setting unit 540. Here, the wireless communication module 502 is switched to the infrastructure mode, and communicates directly to the communication network 550 through an access point (AP) 560.

[0047] As stated previously, the wireless communication module activating unit 540 may also deactivate the wireless communication module 502 by blocking a MAC port of the wireless communication module or by interrupting power supplied to the wireless communication module 502, thus placing the wireless communication module 502 into a deactivation state 580.

[0048] As described above, an operating mode of a wireless communication module, i.e. a wireless communication operating mode, is automatically set according to whether a wired communication module has been linked to a wired communication network, thereby increasing a user's convenience. In addition, since the wireless communication module is deactivated when the wired communication module has been linked to the wired communication network in an infrastructure mode, data can be prevented from being transmitted and received unnecessarily through wireless communication, and delay of data processing can be prevented. Accordingly, waste of power in a system and waste of resources in a network environment can be prevented.

[0049] It is appreciated that the above-described methods may be implemented by a program being executed by a computer, which includes wired and wireless communication means. It is also appreciated that a signal for programming a computer having wired and wireless communication means to perform the above-described method may be read from a data carrier or downloaded from a network.

Claims

1. An electronic apparatus comprising wired communication means (501), wireless communication means (502) operable in an infrastructure mode and control means (540), **characterised in that** the control means (540) is operable to switch the wireless communication means (502) out of said infrastructure mode in response to a signal indicating that the wired communication means (501) is connected to a wired network (550).
2. An apparatus according to claim 1, wherein the control means (540) is configured to switch the wireless communication means (502) out of said infrastructure mode and into an ad-hoc mode in response to said signal.
3. An apparatus according to claim 1, wherein the control means (540) is configured to switch the wireless communication means (502) out of said infrastructure mode and into a dormant mode in response to said signal.
4. A computer including wired communication means (501) and wireless communication means (502) operable in an infrastructure mode, **characterised in that** the computer is programmed with a program for controlling the wireless communication means (502) to switch out of said infrastructure mode in response to a signal indicating that the wired communication means (501) is connected to a wired network (550).
5. A signal representing a computer program for programming a computer to provide a computer according to claim 4.
6. A data carrier having a signal according to claim 5 recorded thereon.
7. A wired and wireless communication method used with a hybrid wired and wireless communication device which can communicate by wire and wirelessly, the wired and wireless communication method comprising:

determining whether a wired communication module has been linked to a wired communication network;

setting a wireless communication operating mode of a wireless communication module to an infrastructure mode when it is determined that the wired communication module has not been linked to the wired communication network; and

setting the wireless communication operating mode to an ad-hoc mode when it is determined

that the wired communication module has been linked to the wired communication network.

8. The wired and wireless communication method of claim 7, further comprising determining whether the wireless communication operating mode has been set to an automatic selection mode by checking the setting of the wireless communication operating mode and going to the operation of determining whether a wired communication module has been linked to a wired communication network when it is determined that the wireless communication operating mode has been set to the automatic selection mode. 5
9. The wired and wireless communication method of claim 7, wherein the operation of determining whether a wired communication module has been linked to a wired communication network is performed in an initial state of the hybrid wired and wireless communication device. 10
10. The wired and wireless communication method of claim 7, wherein the operation of determining whether a wired communication module has been linked to a wired communication network is periodically performed during run-time of the hybrid wired and wireless communication device. 15
11. The wired and wireless communication method of claim 7, wherein the operation of determining whether a wired communication module has been linked to a wired communication network comprises determining whether the wired communication module has been linked to the wired communication network using a physical-layer device chip managing communication of the wired communication network. 20
12. The wired and wireless communication method of claim 7, further comprising setting the wireless communication operating mode to an infrastructure mode when it is determined that the wired communication module has not been linked to the wired communication network. 25
13. A wired and wireless communication method for a hybrid wired and wireless communication device which can communicate by wire and wirelessly, the wired and wireless communication method comprising: 30
 - determining whether a wireless communication operating mode has been set to an automatic selection mode by checking the setting of the wireless communication operating mode; 35
 - determining whether a wired communication module has been linked to a wired communication

tion network when it is determined that the wireless communication operating mode has been set to the automatic selection mode; and setting the wireless communication operating mode to an ad-hoc mode when it is determined that the wired communication module has been linked to the wired communication network.

14. A wired and wireless communication method used with a hybrid wired and wireless communication device which can communicate by wire and wirelessly, the wired and wireless communication method comprising: 40
 - determining whether a wireless communication operating mode has been set to an infrastructure mode; 45
 - determining whether a wired communication module has been linked to a wired communication network when it is determined that the wireless communication operating mode has been set to the infrastructure mode; and
 - deactivating a wireless communication module when it is determined that the wired communication module has been linked to the wired communication network. 50
15. The wired and wireless communication method of claim 14, wherein the operation of deactivating a wireless communication module when it is determined that the wired communication module has been linked to the wired communication network comprises deactivating the wireless communication module by blocking a medium access control (MAC) port of the wireless communication module. 55
16. The wired and wireless communication method of claim 14, wherein the operation of deactivating a wireless communication module when it is determined that the wired communication module has been linked to the wired communication network comprises deactivating the wireless communication module by interrupting power supplied to the wireless communication module. 60
17. The wired and wireless communication method of claim 14, further comprising activating the wireless communication module when it is determined that the wired communication module has not been linked to the wired communication network. 65
18. A wired and wireless communication method used with a hybrid wired and wireless communication device which can communicate by wire and wirelessly, the wired and wireless communication method comprising: 70
 - determining whether a wired communication

module has been linked to a wired communication network; and
deactivating a wireless communication module when it is determined that the wired communication module has been linked to the wired communication network.

19. The wired and wireless communication method of claim 18, further comprising activating the wireless communication module when it is determined that the wired communication module has not been linked to the wired communication network.

20. A hybrid wired and wireless communication device which can communicate by wire and wirelessly, the hybrid wired and wireless communication device comprising:

a wired communication network link check unit which checks whether a wired communication module has been linked to a wired communication network and outputs a check result as a link check signal; and
a mode setting unit which sets a wireless communication operating mode of a wireless communication module to an infrastructure mode or an ad-hoc mode in response to the link check signal.

21. The hybrid wired and wireless communication device of claim 20, further comprising a setting check unit which checks the setting of the wireless communication operating mode to determine whether the wireless communication operating mode has been set to an automatic selection mode and outputs a check result as a setting check signal, wherein the wired communication network link check unit checks whether the wired communication module has been linked to the wired communication network in response to the setting check signal.

22. A hybrid wired and wireless communication device which can communicate by wire and wirelessly, the hybrid wired and wireless communication device comprising:

a wired communication network link check unit which checks whether a wired communication module has been linked to a wired communication network and outputs a check result as a link check signal; and
a wireless communication module activating unit which activates or deactivates a wireless communication module in response to the link check signal.

23. The hybrid wired and wireless communication device of claim 22, further comprising an operating

mode check unit which checks whether a wireless communication operating mode has been set to an infrastructure mode or an ad-hoc mode and outputs a check result as an operating mode check signal, wherein the wired communication network link check unit checks whether the wired communication module has been linked to the wired communication network in response to the operating mode check signal.

24. The hybrid wired and wireless communication device of claim 22, wherein the wired communication network link check unit includes a physical-layer device chip that manages communication of the wired communication network.

25. A hybrid wired and wireless communication method used with a hybrid wired and wireless communication device which can communicate by wire and wirelessly, the hybrid wired and wireless communication method comprising:

determining a state of a wired communication module; and
setting a wireless communication operating mode of a wireless communication module to one of plural communication operating modes depending on the determined state of the wired communication module.

26. The hybrid wired and wireless communication method of claim 25, wherein the plurality of communication operating modes includes an infrastructure mode and an ad-hoc mode.

27. A hybrid wired and wireless communication device which can communicate by wire and wirelessly, the hybrid wired and wireless communication device comprising:

a wired communication network link check unit which checks the state of a wired communication module and outputs a check result as a link check signal; and
a mode setting unit which sets a wireless communication operating mode of a wireless communication module to one of plural communication operating modes in response to the output link check signal.

28. The hybrid wired and wireless communication device of claim 27, wherein the one of plural communication operating modes includes an infrastructure mode and an ad-hoc mode.

29. A user interface unit comprising:

a user interface screen to display plural oper-

ating modes of a hybrid wired and wireless
communication device; and
a panel to enable setting of a wireless commu-
nication operating module of the hybrid wired
and wireless communication device to one of 5
an ad-hoc mode, an infrastructure mode and an
automatic selection mode.

10

15

20

25

30

35

40

45

50

55

FIG. 1

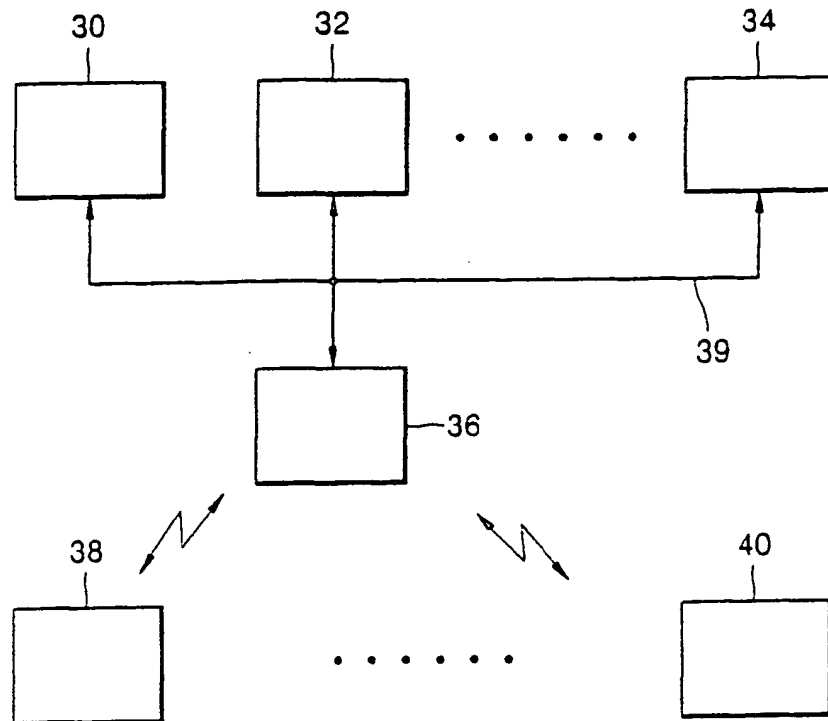


FIG. 2

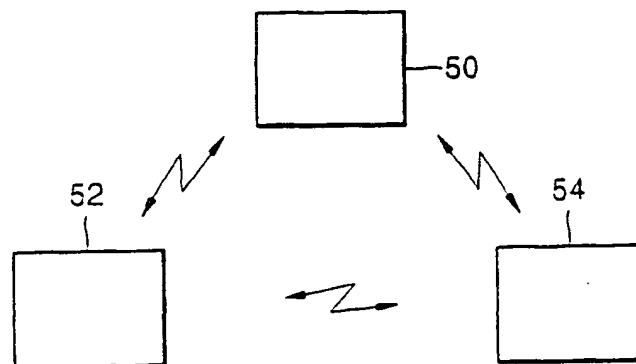


FIG. 3

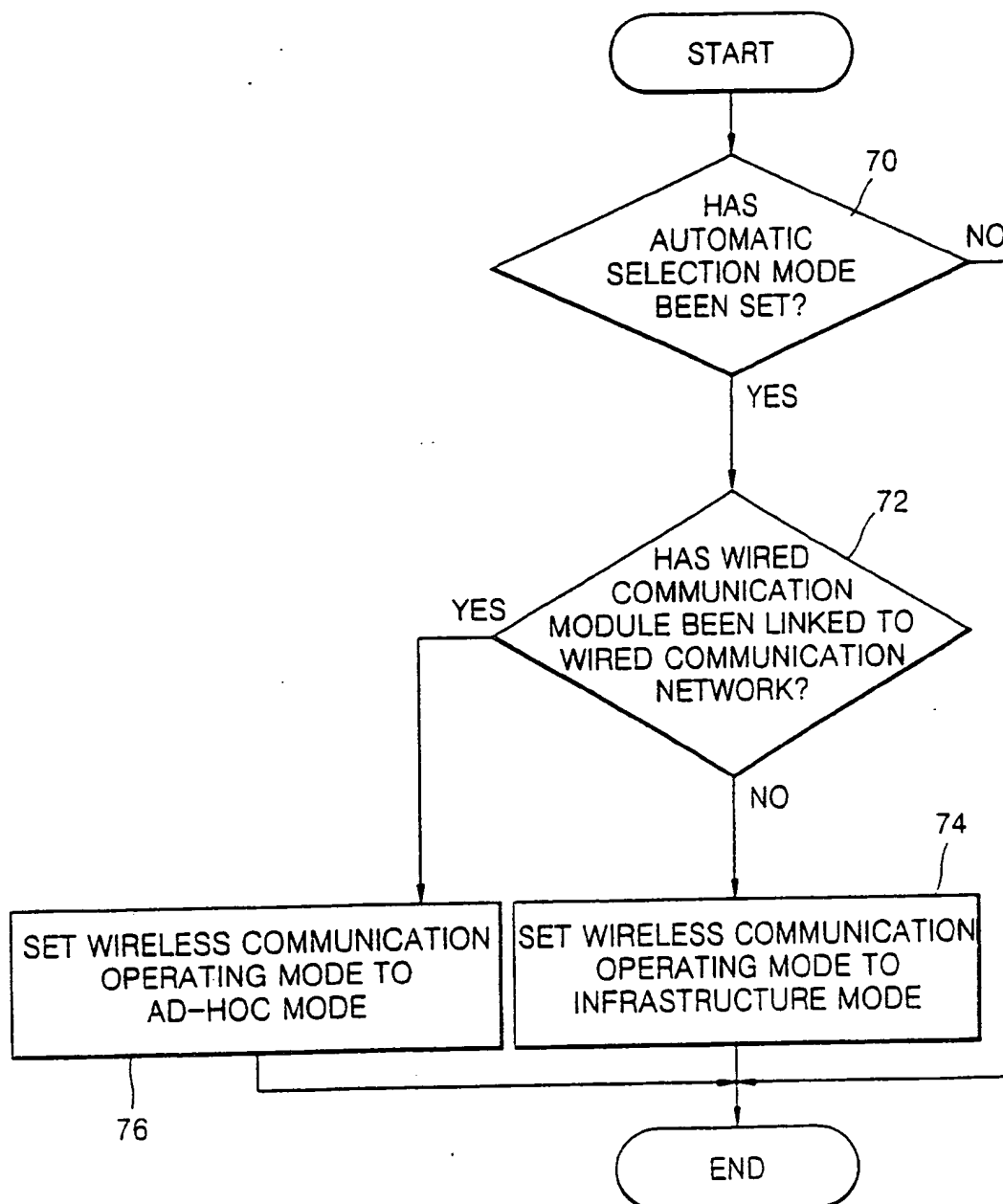


FIG. 4

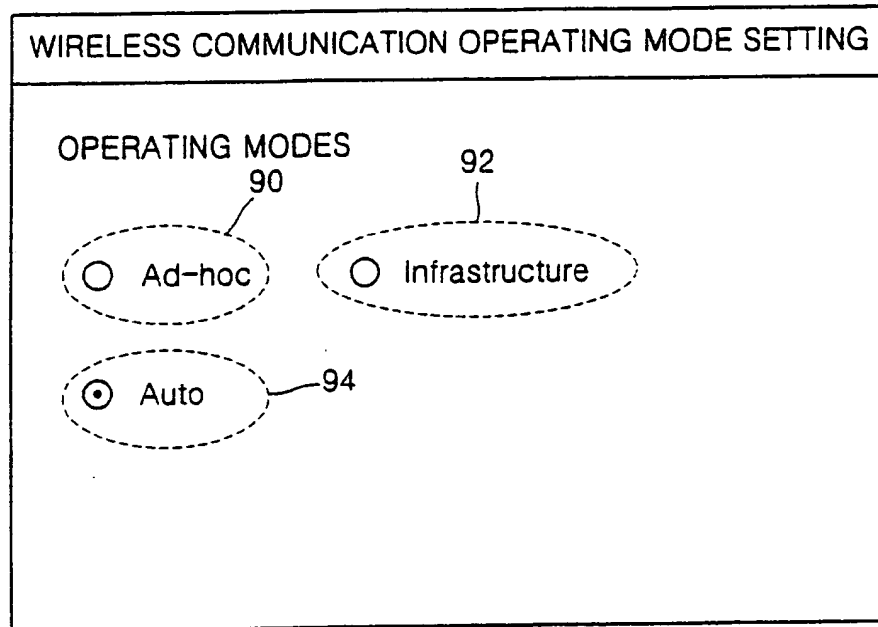


FIG. 5

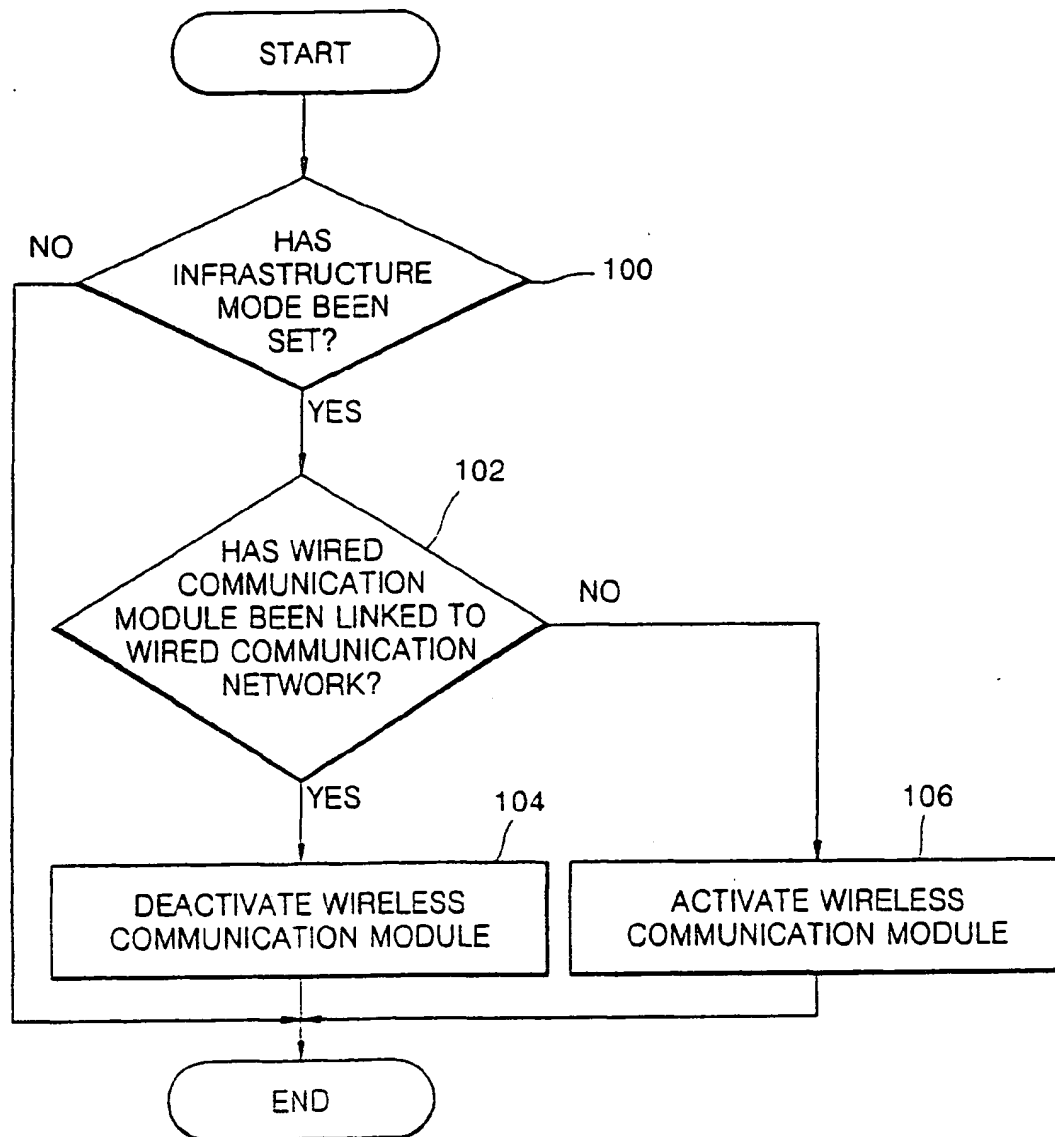


FIG. 6

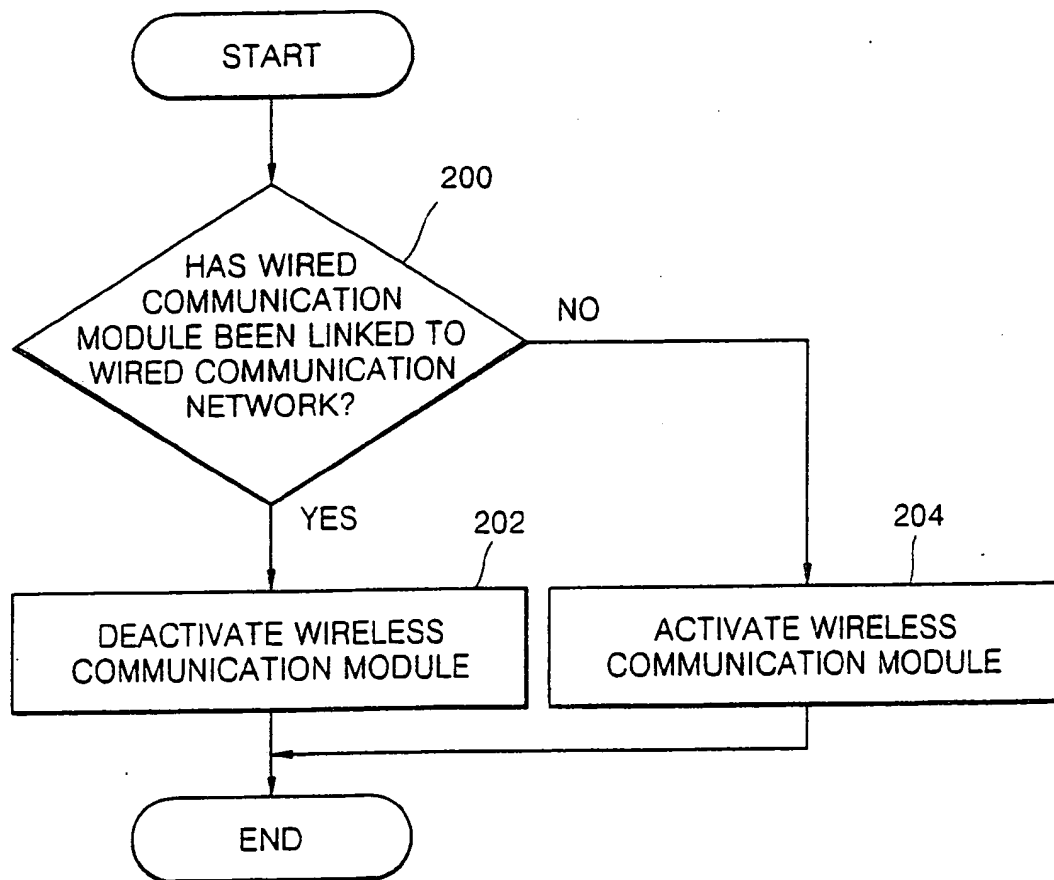


FIG. 7

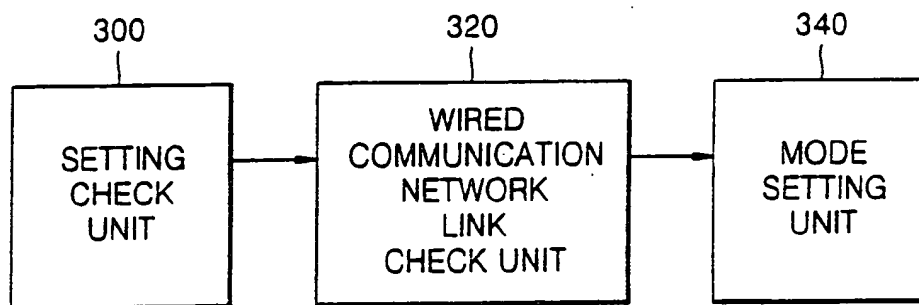


FIG. 8

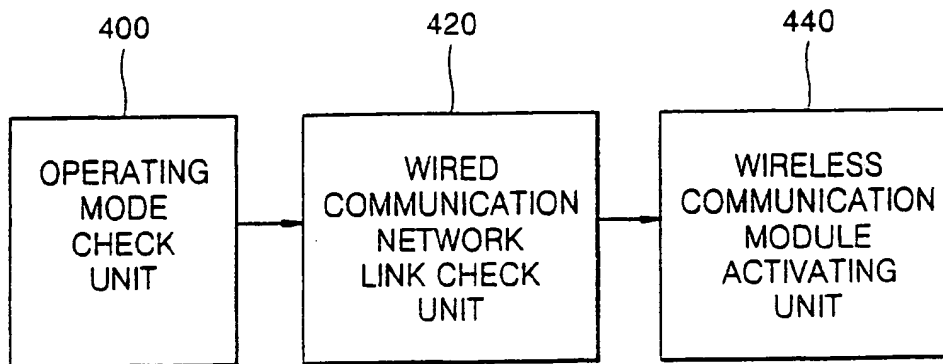


FIG. 9

